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Transdisciplinary qualities in practice doctorates

Carol Costley, Nicola Pizzolato

Abstract

Doctoral programmes in which candidates research their own practice can be characterised as having transdisciplinary (TD) qualities. While most of the emphasis in the literature and in policy on TD is on research in teams, we argue for an expansion of the scope in the conception and understanding of TD research to include the way it can be articulated and assessed in practice-led and practice-based doctorates. In this sense, it is worth exploring instances of doctoral programmes that potentially allow doctoral researchers to undertake projects that have TD qualities. In these doctoral projects, researchers draw from a variety of perspectives, for example from their work practices, the theorisation of those practices, experiential learning, multiple disciplinary knowledge and approaches as well as communications and networking with appropriate stakeholders.

Drawing from previous scholarship of TD in other fields we analyse and evaluate the TD qualities of a particular doctoral programme. This analysis reveals a set of qualities recognised by the literature as TD and relevant to doctoral researchers: Researching collaboratively with stakeholders; Diversity of disciplinary expertise and assessment criteria; Integration of different methodologies; Situating the research in multiple contexts; Impact on the 'situation' through novel procedures or products; Ethics and the importance of trust; Reflection/reflexivity.

The paper posits a convergence between practice doctorates and TD research and demonstrates how TD qualities help doctoral candidates to situate their research at the interface between academia and their professional work and develop projects that have creative and beneficial relevance for practice.

Introduction

This conceptual and evaluative paper illustrated by empirical examples, argues for an expansion of our conception and understanding of transdisciplinary (TD) research training in Practice Doctorates i.e. practice-led and practice-based doctorates (UKCGE, 2011).

A diverse academic culture has emerged in the past decades that praises the creativity of researching across disciplines (Lyall, Tait & Meagher, 2011; Olsen et al., 2013). This has been accompanied by theoretical reflection about the philosophy underpinning this shift (Nicolescu, 2012). Conceptualised as a joint endeavour between academia and society and an encounter of different disciplinary, methodological and epistemological perspectives, TD research has been coloured by the assumption that it should be carried out in teams as in, for instance, the applied literature on sustainability research (Hirsch Hadorn et al. 2008). However, the principle that TD research requires collaborative effort and participation (Klein 2013), does not exclude different forms of collaboration outside the structure of a team, for instance the development of solutions in collaboration with stakeholders, which is, we argue in this article, what happens in practice doctorates.

The question of how to build doctoral research training that would inform a TD approach for new individual researchers, once intractable, has garnered increased attention. Scholarship has rather concentrated on the workings of interdisciplinary and TD research teams (Fuqua, 2002; Thompson-Klein, 1996; Rosenfield, 1992; Nash et al, 2003; Stokols, 2008; Grzywacz, et al. 2008) not on the training of TD research graduates. However, scholars in fields as far apart as nursing, social work, and urban ecology, have lately identified the need for developing doctoral researchers and pedagogical tools that enhance transdisciplinary capacities. (Kemp and Nurius, 2015; Nurius and Kemp, 2014; Larson et al, 2015; Graybill et al., 2006) Augsburg (2014) has identified the complex skills and attitudes that TD research requires from the individual, which raises the question of how to design an adequate research training for 'being transdisciplinary'. Projects such as the 'Toolbox Dialogue Initiative' have raised the question on how to overcome the methodological challenges of collaboration among researchers across disciplines (Eigenbrode et al. 2007). While there has been some research on undergraduate and postgraduate TD curricula (Hirsch Hadorn Schmied and Frischknecht, 2011; Hammer and Söderqvist, 2001) both the literature and the pedagogical practice are not often concerned with TD components in doctoral programmes; a similar need for scholarship has been noticed for interdisciplinary research pedagogy (Manathunga, Lant and Mellick 2006). We situate our work in the growing and evolving transdisciplinary doctoral field but draw upon Boyer's (1990) classic work as a starting point.

Addressing the dissatisfaction with a university model that saw disciplines sitting in departments ever-more disconnected from one another and a dominant conception of research measured narrowly by academic publications, Boyer (1990) has put forward an alternative model of scholarship. Boyer called for a scholarship that would go beyond the pure research that advances knowledge, to include one that integrates knowledge across disciplines 'forcing new topologies of knowledge' (Boyer, 1990, p. 19), one which is applied to societal problems and defined by them and, finally, one that informs, and is informed by teaching. Boyer has been influential in expanding the concept of what counts as legitimate scholarship (Rice, O'Meara, 2005) even as disciplinary approaches to knowledge remain prevalent in academia

In response to a governmental and public discourse more receptive to inter- and trans-disciplinarity, in North America, Australia and the UK, a number of both interdisciplinary and transdisciplinary doctoral programmes have been established and there is some emerging research on how to foster TD competencies in regards to certain fields, for instance sustainability (Fam et al 2017). These programmes, which include professional doctorates (see below), attempt to prepare their graduates to participate in a collaborative, interdisciplinary production of knowledge fit for the complex problems of the twenty-first century (Holley, 2015).

In this article, we identify, on the basis of previous studies, the transdisciplinarity qualities of practice doctorates' projects and how they are assessed to analyse a specific example of how transdisciplinarity can inform the outcome of higher education curricula and pedagogy at doctoral level. Evaluation of transdisciplinary qualities is in itself a debated topic (Belcher et al. 2016). Wickson, Carew and Russell (2006) have differentiated the qualities that distinguish transdisciplinary research in 1) a problem-solving focus; 2) an interpenetration of methodologies and epistemologies from different paradigms and 3) a collaboration between researchers and stakeholders. However, these scholars have not translated these characteristics into qualities of the doctoral programme that impinge on the projects the students' research for the completion of their degree. Mitrany and Stokols (2005) have investigated such a

dimension in a rare instance of an empirical study of a doctoral programme through the lens of transdisciplinarity. Mitchell and Willets (2009), following Boix Mansilla (2006), have characterized Mitrany and Stokols' approach as developing " 'objective measurement criteria', which would provide 'reliable and reproducible measures' of the transdisciplinarity of the dissertation projects" (Mitchell and Willets 2000, p.5.). We have drawn on Mitrany and Stokols' qualities and Mitchell's, Cordell's and Fam's 'outcome spaces' of transdisciplinary research (2015) to inform our analysis of a particular doctoral programme. This enables us to identify the TD qualities that characterize this programme, thus providing an empirical test to an array of conceptualization in the literature. Whilst we use precise criteria from Mitrany and Stokols we do so only to benchmark what we describe as 'qualities' which we hold as being likely to be present in most practice doctorates in various forms. It is necessarily a less precise outcome that addresses complex knowledge production in 21st century work situations.

Our case of detailed inquiry is the Doctor of 'Professional Studies' or 'Professional Practice' (DProf) . The DProf emerged in the UK in the late 1990s and later in the USA, Australia and New Zealand (Costley and Lester, 2012, Fillery-Travis, 2014). It builds upon the doctorates that have strong practice-focussed approaches such as those in the Arts, but is part of a wider trend of doctorate degrees internationally engaged with knowledge production in practice settings, which include the industrial PhD and the EdD. Candidates undertaking the programme in a London university come from different professional backgrounds and their expertise is not possible to be defined as belonging within a single discipline. The programme evolved from a generic work-based learning framework and includes features such as reflection on experiential learning, practitioner inquiry project design, and a research project rooted in professional practice. The outcomes of the candidates' doctoral projects are vastly different but fall within a scholarship of integration and application (Boyer 1990); they have in common a reflection on and intervention on practice, the candidates' own or within the organisation, with the ambition to impinge on their wider professional fields and communities of practice. The authors of this article are part of a team of staff that have designed and advised on the DProf programme over a number of years. As a result this article has been informed by the analysis of more than 30 doctoral projects as well as by our experience and predispositions as part of the faculty.

We investigate this topic against the backdrop of the emergence of professional and practice-based doctorates in the academic landscape since the 1980s that have transformed conventional approaches to doctoral training by positing a new epistemological relationship between education, research, industry and the public sector (European Commission, 2012). Practice-based and practice-led doctoral programmes, in which knowledge production, knowledge management and research processes are tied with the context of their application, prove to be more responsive to the fluid character of knowledge creation that characterises the contemporary world. In our view these programmes address the necessity for 'a heightened *epistemic flexibility* within curricula' that Barnett (2014) recognises as a key educational challenge for the future.

Transcending boundaries in research approaches is now more prevalent and accepted. For example, TD teams (a practice that is growing particularly in the fields of environmental sustainability, medical/health, education, policy and social research) integrate researchers coming from different professional cultures and disciplinary subfields (Pohl and Hirsch Hadorn, 2007; Hirsch Hadorn; 2008, Leavy 2011). This in turn has led to policy changes; interdisciplinary research that is recognised and encouraged by UK research councils (Griffin, Medhurst and Green, 2006) and cross-council funding available since 2006 (Research Councils UK). Always at policy level, a 'European Research Area' is driving integrated science, from basic

research and scientific training, to applied research and innovation (European Commission 2012). Wickson, Carew and Russell (2006: 1047) have interpreted this as evidence of a changing landscape for research, one increasingly geared to produce knowledge which solves real-world problems in specific contexts.

The literature has sometimes focused on the barriers to TD university education (Stokols, 2008, Fuqua et al. 2003; Thompson-Klein, 2006). It can be problematic to train academics steeped in a disciplinary world-view to take a TD approach. Academics advising on such professional doctorates find that the candidates are advantaged in that their professional practice is often TD in nature; the doctoral programme enables them to conceptualise their practice and further develop it in a research project. In this respect, the transdisciplinarity of the research project will depend on the background and practice of the individual candidate. The DProf is not positioned in a particular discipline or bound to follow a particular paradigm. Candidates can select the approaches they use and conduct their research according to the creative change, intervention or pursuit that they are investigating in a practice situation. They may choose this route because, as one candidate who worked on the Thames barrier said, “I did not want to do a PhD in Engineering because there was not enough engineering in the issue I wanted to investigate”. Candidates who graduate from the DProf programme do not go on to become TD scientists or scholars, but they do inform their advanced professional practices with approaches, knowledge and values which are consistent with TD research.

Examples of DProf research projects¹

Three specific examples of DProf projects can better convey the idea of how practice-led research by a single researcher can lead to TD outcomes, though not in a way that can be predicted with precision.

-In ‘Health and Safety Management in the Offshore Oil Industry’ (2010), the candidate investigated methods and practices for minimising occupation casualties in the offshore industry, which represents a major concern within that sector. The problem was from the onset defined with a high degree of integration between different fields recognising that levels of hazards were not only associated to sound safety procedure and technical maintenance, but to the interaction between a multi-cultural crew, typical of that industry, and safety management systems in place. In dialogue with an advisor with a background in social sciences and with an expert in his own field, the candidate adopted a diversity of research methods that reflected the fact that the problem was situated at the crossroads of two different paradigms and methodologies of research. In this respect this project benefitted from a diversity of expertise available to the candidate and a methodology that was ‘evolving’ (Wickson, Carew and Russell, 2006) and customised. The candidate used participant observation together with analysis of safety management systems, drawing on the work of Mary Douglas on the ‘cross-cultural safety consciousness’, to show how a culturally and socially constructed risk perception impinged on the effectiveness of safety management. The conceptualization of the research topic was thus very broad, including the intervention as insider-researcher of the candidate in his own workplace. The project was characterised by a tension between the ethical challenges of the inquiry and the drive to act for the common good of the industry and the staff. The findings were then translated in a model adaptable beyond the specific offshore rig to the whole industry and, potentially, to other multi-cultural crew environments in high-risk sectors.

¹ See <https://docs.google.com/document/d/156PeKmVzvJ4CU6wP8QsIW7eQdxAmbgloWeXv5-4MSAo/pub> for an indication of the range of titles and approaches undertaken in DProf projects.

-In 'Boat design deriving from ethnographic study: a TD approach to Malaysian fishing boat design' (2011), the candidate investigated how to design a fishing boat that responded to local culture, rather than to the dictates of an Eurocentric tradition. As in the previous one, the project required an integration of methods of research, drawing from anthropology and industrial design, and a redefinition of paradigms, correcting the typical positivist bias in boat design with a constructivist perspective. Again this was favoured by the engagement with a disciplinary diverse advisory team and by trustworthy *collaboration* with stakeholders. The project moves from inter- to trans-disciplinary components in that not only is it based on an ethnographic study of fishermen, boat builders, designers and owners in Malaysia, which informed the design but that it also involves these stakeholders in the performance, aesthetics and safety of the model proposed. Thus, together with a specific design for a boat, the project provides an example of a product development process that integrates the designer and stakeholder's perception and which engages directly with the problems of communities of practitioners and is responsive to societal needs. Fulfilling our last criteria, the development of this project required the candidate to be particularly reflective as he juxtaposed the persona of an anthropologist to the one of an industrial designer.

-In 'An evaluation of the impact of four service improvement initiatives within a community based Musculoskeletal Chronic Pain Service on patient engagement and effective service delivery, using an embedded case' (2013), (project not submitted yet) the candidate approached a typical interdisciplinary problem by investigating how to improve the service experience of chronic pain patients in an integrated manner. As the service is provided by a multi-disciplinary team involving doctors, nurses, and administrators in the context of a range of physical locations the problem of patient experience and engagement is 'messy', but one of crucial interest for both health care and service delivery professionals. The project was driven by important ethical considerations, the involvement of the expertise of different stakeholders, and a methodology where action research met case study design.

The DProf Candidates engaged in these projects have specific background knowledge and understanding that they bring to their research projects. They are 'practically embedded in the practice being studied (Eikeland and Nicolini, 2011, p. 166) and the research they undertake will impact upon their organisation or professional field. These three projects engaged with multiple sources of knowledge and connected each knowledge area in one conceptual framework with the intention of addressing a real world project in a situated practice. By fostering transdisciplinary qualities, a practice-based doctoral programme can enhance abilities to bring insights from practice that add to, refine and critique work-based issues.

Lester (2012) examined a number of DProf projects from the same scheme and found that:

"Complex change-oriented issues...approached with a researching and critically reflective orientation can be a powerful source, not only of contextual insights but of academically and professionally-valid knowledge, giving rise to new concepts, models, theories and critiques as well as different ways of doing things....[and] is in most cases transdisciplinary".

Lester, 2012, p. 279

Lester examined a random sample of DProf projects and found that most but not all were significantly transdisciplinary depending on the nature of the project under investigation and the research approach. His study demonstrates that practitioner-led research is most conducive to transdisciplinarity as the knowledge production necessary to make significant change and develop creative and purposeful interventions in work situations goes beyond and crosses over disciplinary boundaries.

Mapping transdisciplinary qualities in DProf Projects

We have initially taken the cue from the TD ‘qualities’ identified in a previous study of a doctorate programme (Mitrany and Stokols, 2005) and subsequently interpreted it within the wider framework of the ‘outcome spaces’ of TD research, which maps three broad outcomes: ‘improving the situation’; ‘contributing to knowledge stocks and flows’ and engaging in ‘mutual and transformational learning’ (Mitchell, Cordell and Fam, 2015).

By looking to our own case study against this backdrop, we suggest that practice doctorates foster qualities in research which sit at the nexus of different epistemological traditions, leading to a greater interrelation of different forms of knowledge in research projects. This integration between knowledge produced in academia and in the professions, beyond the boundaries of existing disciplines, is at the core of transdisciplinarity.

1. *Researching collaboratively with stakeholders.*

In the programme we examine, we found that the DProf practitioner-researchers establish an intellectual dialogue with multiple academic, professional and societal contexts. This occurs in the definition of the scope of the project which might sit beyond the conventional remit of any specific academic discipline. Mitrany and Stokols (2005) also report that there is a degree of integration between theories and practices in different fields, but we found the DProf projects went further in that they blur the boundaries between the academic and the professional as it comprises the involvement of stakeholders in the definition of objectives, methods, and data. In this respect this quality is related to the characteristics of *collaboration* in TD research as identified by Wickson, Carew and Russell (2006). DProf projects can be participatory both in the sense that they draw from knowledge produced from working in teams and that they intervene in a professional setting through participatory methodologies, such as action research and methodologies that incorporate a heavy focus upon recommendations and further actions. This recalls the idea of ‘mutual learning’ (Mitchell, Cordell and Fam, 2015) as a process of collaboration that integrates different expertise among stakeholders.

Relationships across professional and academic cultural boundaries are built – often between practice and research through carefully judged networking with appropriate communities and individuals from academic and professional fields bringing about the sharing of expertise that DProf candidates engage with by drawing from the perspectives of people from their own and other professions to incorporate different values, interests and cultures.

Finally, DProf research project proposals require the endorsement of a third party expertise from the context in which the project will be researched. The third party can be an employer or expert in the field who verifies that the research is likely to have a positive, useful impact. It can also be a way of ensuring endorsement of access to appropriate data.

2) *Diversity of disciplinary expertise and assessment criteria*

Mitrany and Stokols had pointed out the crucial importance of exposing doctoral candidates to different disciplinary perspectives. In the case under study, the programme team and Research Degree Committee are drawn from a pool of academic tutors committed to and trained in practitioner research and a TD ethos. The structure of the programme provides for the candidate's advisory (supervisory) team to be composed of one academic adviser whose expertise lies in researching professional practice and has the role of steering the candidate towards the learning outcomes of the programme (all a-disciplinary, designed to measure the level of abilities irrespective of the professional sector), and one or more consultants who are experts in one or more of the specific professional fields in which the project sits. Thus, the DProf advisory team is not composed of academics from different disciplines, but rather experts from different academic and professional backgrounds, often rooted in professional practices, who collaborate by providing formative assessment on different aspects of the candidate's work. The final assessment is built around generic and TD criteria, well articulated for assessors who come from a range of backgrounds in order to reach a consistent judgement of the research projects (Costley, 2015).

Some of these TD principles of assessment have emerged from the practice orientation of work based learning as an area of studies in higher education. In this respect, Boud (2003) firmly makes the link between the learning from work situations being TD and that assessment protocols necessarily use criteria that measure TD learning.

3) *Integration of different methodologies.*

Mitrany and Stokols have found that the triangulation of different qualitative and quantitative methods is characteristic of the case they study and 'reflects the greater tolerance for multiple research perspectives and inclusive thinking' (p. 442) in TD research. A TD DProf project adopts a similar approach by using a methodology customised to the project, breaking with the idea of discipline-based methodologies. This integration is pushed a little bit further in the projects, by using the practice-led and practice-based research as a way of joining different epistemological paradigms. As practioners, DProf Candidates often have standpoints that have developed within their situated practices. These insights allow them to ask new questions of epistemology. For example by considering the research approach, methodology and instruments which are congruent with the focus of enquiry and the outcomes that are proposed for self, academia, organisation and wider community of practice.

4) *Situating the research in multiple contexts*

This quality reflects the range of spatial, temporal, social and cultural contexts reflected in the conceptualisation of a particular project. In practice-based doctorates such as the one we examine there is a deep level of reflection upon candidates' own practice and the practice of others. Practice is always embedded within numerous contexts. Knowledge and information embedded in practice

provides, in turn a range of the different lenses through which texts can be viewed. This has resonance with not just the notion of a material reality for the DProf researchers but also the complex interrelationship in connecting texts to other texts in the act of textual creation or interpretation.

The conceptualisation of the candidate's research needs to link to wider issues. Data collected by candidates is likely to be context specific but theorisation and conceptualisation of the situated research area will incorporate broader understanding, a wide range of reading from academic and professional sources and often international perspectives.

This quality refers also to the generation of insights applicable from micro to macro level and everything in between. The number of analytical levels in a DProf project varies and would depend on the specific focus. There is definitely a tension between the nomothetic and idiographic levels of a research project that is based on individual practice, but located in a set of interrelated contexts, some very broad in scope.

The situation and circumstances of the practitioner-researchers constitute in themselves an element of the practice that is being researched: institutional conditions, events, narratives and images may be relevant. Interpretation involving social values becomes the subjective views of the practitioners and so there is a dialectics between text and context. In this sense the number of analytic levels that can be used are in some ways related to the analysis that practitioner-researchers make of the evidence in written texts and other artefacts in relation to their context.

5) Impact on the 'situation' through novel procedures or products

This quality concerns the real-world impact of the research and its application beyond the sphere of academia. We draw here on Mitchell's, Cordell's and Fam's (2015) notion of 'improving the situation' as an appropriate term to describe the commitment typical of transdisciplinary researchers to have an impact on 'messy problems', which do not easily lend themselves to be permanently closed or solved.

Transforming a 'real-world' situation through research is a key aspect of professional doctorates where candidates work at the interface between situated practice and academia. As the projects are often problem-focussed and/or creative in nature they do contain at the onset, an analysis of the expected impact upon communities of practice, the professional field, and society as a whole.

By emphasizing this quality, we would accentuate the transformational applications of such practice-based research. It is not disputed in the literature that transdisciplinarity fosters knowledge production aimed at the solution of real-world problems (Hirsch Hadorn et al., 2008; Mobjörk, 2010; Russell et al., 2008). Knowledge produced by practitioner-researchers tends to have definitive impacts and be disseminated beyond academic audiences, in their working environment. One rationale for research rooted in practice is posited upon its resulting change or addition to a work setting. In DProf programmes the practitioner undertaking the research is often the person who also then develops the outcome in the work setting, frequently along with other colleagues. Alternatively, the research project seeks to persuade others to make tangible changes in a work setting through recommendations or the implementation of new procedures and products

Although the scale and scope of the TD qualities varies in the projects, the outcome of these work-based research degrees reflect the field of professional studies as being highly responsive to societal needs and often operating beyond specific disciplinary conventions.

6) *Ethics and the importance of trust .*

TD research has by definition a deep societal impact, it engages with problems of uncertain solution and often involves a variety of stakeholders. Harris and Lyon (2014) find that trust is vital in research collaborations between industry, different disciplines and different types of research organisations. Their findings concur where they discuss building the research relationship on existing relationships, intermediaries or guarantors. For practitioner researchers who may already have a reputation as professionals in their organisation, trust can also relate to reputation and the good name of the practitioner turned researcher when gathering data for the research and making recommendations for change that may impinge upon the subjects of the research.

TD research also embraces the challenge to the positivistic notion of a value-free inquiry conducted by objective experts and is often characterised by value-conflict, and therefore needs to have these kinds of ethically informed values at the forefront of ethical considerations (McGregor, 2015). The 'Legitimacy' of a research project, in the way identified by Belcher et al. (2016), is achieved through trustworthy, open and transparent collaboration by all the stakeholders of the research. The nature of candidates' research may raise issues around values. For example the imperative of making changes and implementing the research within a specific time-frame and the rationale for the purpose of the research all impinge on the values of the researcher and other stakeholders.

Doctoral candidates need to make considered judgements and decisions in relation to the deep knowledge of people and organisational protocols that their research brings to the fore and the impact of their projects on stakeholders and the wider public. Like much TD research, DProf projects are often transformational and should be mindful of the public good in consideration of their purposefulness. This is because candidates seek to make change or bring new ideas to their own communities of practice and so the way they are perceived by others can affect the legitimacy of their proposed change. There is a need to be recognised, reviewed and trusted by peers. The practitioners, as insiders in their field of enquiry, find themselves needing to provide compelling and persuasive arguments to a range of audiences. Their positionality and the way they are thought of in terms of their own personal ethics and values is a key factor in implementing the outcomes of the research. The ethical considerations of TD research therefore give high priority to values and utility whilst truth and merit remain as key concerns which have implications that change the rank order of the established views on research ethics.

7) *Reflection and reflexivity*

We find this quality a necessary, but not sufficient, condition of a TD approach. This is the ability to critically assess one's positionality within the process of knowledge production and in relation to different epistemologies

Studies has shown the importance of reflexivity to build TD teams in the field of addiction research (Greaves, Poole and Boyle, 2015), in sustainability research (Popa et al., 2014) and whenever participation is an important component of transdisciplinarity (Pohl, 2010). It has been argued that 'bringing reflexivity into processes of knowledge production is both the claim and the main purpose of TD research practice' (Jahn et al., 2012, p. 2-3). Ison (2008) points to the centrality of reflection and reflexivity in TD practice and finds the need for 'an awareness that failing to appreciate differences can lead to losses, particularly sources of new insight and innovation' (p. 248).

Reflexivity is also central to the DProf as a programme of study that aims to articulate knowledge embodied in practice, which emerges with the engagement of candidates with their own practice and their own positionality. The DProf pedagogy steers individuals to develop a reflexive understanding of themselves as practitioners; to articulate and negotiate the value and status of the knowledge products of their own research project; and to question the legitimacy of current practices towards innovation and enhancement. Professional reflection is used widely and there is ongoing critique in relation to its use which has been that much reflective practice is too focused upon the individual instead of group/team work orientations (Boud, 2010), and that situated understandings of reflective practices can sometimes be understood as confessional and as surveillance and control (Saltiel, 2010). Engaging in a critical reflection with an embodied and contextualised approach and giving attention to power relations and knowledge/power can enhance professional doctorate learning.

Doctorate candidates who are researching their own practice consider their own positionality in their research setting to gain ontological insight into their research. Inevitably they engage in a reflexive process as they have already put themselves into the frame of the research because of their expertise in the field as developers of current practice.

These seven qualities are relevant in forming a TD approach to knowledge production because they are usually constituent parts of situated research projects of the DProf and many other practice doctorates.

Discussion

We have given an example of one practice doctorate to infer that TD is relevant to most practice doctorates because practitioner-researchers operate beyond the disciplines when they research their own professional practice and make creative interventions or solve problems. For example, this occurs in: their work practices, the theorisation of those practices, experiential learning, engagement with stakeholders and communities of practices as well as relevant disciplinary knowledge. The benefits of a TD approach have also been highlighted in practice doctorates in the arts (Newbury 2012). We suggest that the vocabulary and qualities of TD research enable doctoral candidates to articulate their projects in terms of their societal benefit, to encompass a broad range of stakeholders and perspectives and to plan for change in particular contexts.

We also suggest that the reason why practice doctorates have developed TD qualities is because practitioner-researchers design their projects with a strong application in their own professional fields which is recognised and endorsed by their peers. Although they usually develop a strong link with academia during their doctorate they also seek their recognition from the critical communities in their professional areas, creating interplay between practice-focussed and scholarly research approaches. This view is consistent with the emergence of a 'practice turn' among social theorists. In this respect, Schatzki et al (2001) and Kemmis (2010) have cautioned against an artificial separation between theory and practice and it is not the intention here to support such a dualism by separating so called practice-oriented Doctorates from so called theoretically-oriented ones. Our focus is on the potential

for TD qualities in doctoral research programmes where practitioners undertake a research project within their own work-related area of expertise.

The artificial separation of research from practice and the narrow interpretation of knowledge production has changed across most fields to varying extents. However much of what has been called traditional or classical models and approaches are still embedded in texts on research, curriculum models and are still espoused by some thinkers. We found that Practice Doctorates and in our case candidates on the DProf, tend to attract candidates who are already situated in practice and who want to engage with research that makes a positive difference to their own fields of practice. University education is central to 'provide crucial competencies and motivation for such [transdisciplinary] endeavours' (Hirsch Hadorn et al, 2011, p. 80). In its absence, as Gehlert has commented, 'lack of systematic education in TD science reinforces what has been referred to as the "siloed" nature of research, and hinders the transfer of knowledge across disciplines' (Gehlert, 2013, p. 8). In this respect, doctoral programmes undertaken by practitioners who research in the context of their own practice provide a significant contribution. A TD approach concurs with a growing tendency in doctoral education to become more practice oriented.

There is also the relatively new phenomenon of the establishment of PhDs in transdisciplinarity, in particular in the field of sustainability.

Scholars have drawn on, for example, Foucault, Bourdieu, Levi-Strauss, Heidegger and others to analyse how the context of professional practice shapes research inquiry. It encompasses both disciplinary knowledge that students want to acquire and the idea of socially distributed, practice-oriented, TD knowledge (Nowotny et al 2003, Scott et al, 2004, Maguire, 2015) which responds to multiple stakeholders.

DProf projects are participatory in the sense that they draw on knowledge produced in the interaction with a range of interested parties, relationships and networks. Our highly networked society is reflected in the work of the professional practitioners who undertake practice doctorates. This kind of exchange and co-production of knowledge is a feature of the way people work and therefore a feature of a practitioner-led research project and is a quality that was prevalent in our study.

One quality concerned how doctoral projects in our study demonstrate an awareness of and relevance to multiple contexts and the positionality of the researcher, within awareness of a 'bigger picture' and this is embedded in the research design whereby the practitioner-researchers' conceptualisation of the topic, use of research methods, evaluation and analysis is encouraged to be TD. We also found the quality of transformational impact and translation of the research into recommendations for practice. The transformational impact is linked to ethical considerations that are clearly aligned to the values that are held by the researchers and by their communities of practice. Also qualities that involve trust that need to be given careful and critical examination in that the practice projects involve a range of other stakeholders and beneficiaries who may be involved in data collection and implementation.

A key TD quality was that practitioner-researchers as insiders reflect and are reflexive about their practitioner role in the research. Professional reflection has become a common component of higher education curricular for professionals because it has been found to enhance professional practice. Researchers have to look at issues from the perception of others, given that we all have differing backgrounds, sets of values, ways of working and so on (Ison, 2008). Reflection is, by its nature part of a

TD approach and incorporates the holistic 'self' which is not bound by disciplines but draws upon the ingenuity of experience and identity. A critical and analytic reflection on knowledge is not relativistic when engaged with positive considerations of values and rigour. The production of situated theory is predicated on the reflexive awareness of theorists to their part in the construction of new knowledge.

These developments bring attention to a less recognised aspect: the value of integrating transdisciplinarity in doctoral research pedagogy and curricula in order to overcome the structure of disciplinary differentiation in academia and prepare researchers for the complex challenges of society and organisations. The DProf and other practice doctorates have developed curricula and pedagogical approaches that recognise the potential for transdisciplinarity and thus facilitate the production of knowledge in situations rooted in professional practice (Armsby et al, 2017). A key issue is the nature of course design and candidate support that provides flexible patterns of research and development. For example where criteria for assessing and accrediting learning are broad and discerning they can stimulate the assessors, as well as the candidate, to step beyond disciplines. Doctoral pedagogy, curriculum and assessment can better reflect the TD qualities of doctoral education and the outcomes of doctoral research.

More considerations in terms of policy-makers, curriculum developers, academics and other stakeholders can be given to the nature of high-level professional practice and how higher education can support developments with its expertise in research, critical thinking and a whole range of pedagogical practices that can be of benefit to individuals and communities outside or on the periphery of higher education networks. For example approaches to postgraduate training and research activities can include the development of appropriate methodologies for practitioner-led research which address highly contextualised knowledge within situated practices.

Conclusion

We have drawn heavily on the work of colleagues in the field of TD who work in the broad area of sustainable development because this is where much of the scholarship resides. We have also drawn upon authors who have found that the scholarship around TD resonates strongly with research in practice situations of practitioners who undertake professional doctorates. The intention is not to fix a research process or hold onto any particular methodology or reify any list of necessary components. The purpose of the paper is to suggest that there are a number of qualities that are likely to be present in practice doctorates where the researcher is a practitioner and an insider in the field of research and the qualities are warranted for the successful outcome of the research project. This is a compelling case for why TD has greater relevance to practice.

The TD qualities we define help candidates to situate their research in their practice underpinning the practice with theory and academic insights. This is because the way the qualities are constructed enables a broad range of factors to be taken into account encapsulating the convoluted nature of everyday activities, a range of academic perspectives and what is most relevant to the particular situated project. We demonstrated that in practice doctorates, candidates engage in research that sits at the nexus of different epistemological traditions, leading to the greater interrelation of different forms of knowledge. Practice doctorates relate to debates about the production and validity of knowledge. The nature of

knowledge is questioned and this raises epistemological questions. There are implications for doctoral programme design, doctoral pedagogy and academic cultures. Higher education professionals who develop doctoral degrees are thinking more in terms of the worth of TD qualities in having a creative and beneficial relevance for those doctoral candidates who seek to make changes in practice. Research undertaken as part of a practice doctorate has the potential to enhance practice and provides benefit to particular professional groups and organisations that in turn are likely to bring positive outcomes to the wider society. It is produced by researchers who gain awareness of the contexts in which their knowledge is produced and who are responsive to a range of stakeholders. The conceptual language of TD has been particularly constructive as a way to think about practice doctorates especially in regard to the example of the DProf given in this paper. Disciplines use particular specialised language and terminology that informs a discipline specific dialect. TD is able to use concepts relevant to the project at hand, to focus upon real world creations and/ or problems requiring an appropriate conceptual language.

Curriculum innovation in the area of practitioner-led research has led to a doctoral pedagogy that nurtures the creation and application of knowledge needed to solve complex societal problems involving diverse stakeholders. Although there has always been doctoral researchers that have undertaken practice-oriented research, some areas of doctoral education have now developed pedagogies and curriculum innovations that better facilitate the development needs of knowledge production in practice situations. The inference here is that the TD qualities of a doctoral programme are key components of this model. It can be expected that forms of doctorates that have more TD qualities will continue to grow and be accorded value and significance .

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